NorthMet Project – Change Definition Form (CDF)

Topic: Colby Lake GoldSim Calibration
Version: CDF 201 Version 2
Date: September 11, 2014

This form has been developed to document changes to the NorthMet Project and/or Project Water Modeling in response to direction from the Co-Lead Agencies. The forms will be used during the water modeling process. At the end of the process, the Project Description, Data Packages and Management Plans will all be updated as needed to reflect the content of all forms submitted during the process.

Change Type:

Mine Site GoldSim Model Revision

Rationale for Change:

Public comments received on the SDEIS cited poor model calibration for Colby Lake surface water quality. Specifically, median constituent concentrations returned by the GoldSim model under the continuation of existing condition scenario differ from the observed mean concentrations for some constituents.

This occurs, in part, because the GoldSim model used in development of the SDEIS was not specifically calibrated to Colby Lake. Concentrations of constituents in background groundwater and runoff from surface area tributary to Colby Lake are assumed to be the same as those in the upper Partridge River watershed. However, for several constituents, concentrations observed in the Partridge River immediately upstream of Colby Lake (i.e., at SW005) differ from those observed in Colby Lake, suggesting that there are additional sources of load to Colby Lake. The GoldSim model does not consider loading sources to Colby Lake other than the Partridge River.

Description:

Barr proposes adding an additional source of constituent load to Colby Lake in order to produce a better match between observed and simulated conditions. The source will be a new term in the GoldSim model and will add mass to the model node representing Colby Lake (i.e., the units will be mass/time). No additional flow will be included with this source term. The source term will be a deterministic, constant term (i.e., it would not change between model runs or timesteps within model runs).

The value assigned to each constituent in the source term will be determined via calibration. This calibration will be performed using the No Action calibration model (described in Section 5.2.4.7 of the Water Modeling Data Package – Volume 1 Mine Site v12). The No Action calibration model is a version of the Continuations of Existing Conditions model limited to a 20-

year modeling period and 100 iterations (to reduce run time and produce a manageable data set) Values for each constituent in the source term will be varied to minimize the error between the median modeled concentration returned by the No Action calibration model and the median observed concentration in the available NorthMet data collected from November 2008 and through 2013.

Calibration of the Colby Lake source term will be performed following updates of the groundwater distributions and recalibration of the surface runoff concentrations (see Section 5.2.4.7 of the Water Modeling Data Package – Volume 1 Mine Site v12), as this source is physically located downstream of the influence of the surface runoff concentrations.

The calibrated chemical loadings associated with the new Colby Lake source will not be modified during subsequent transient runs of the GoldSim model to assess Project impacts (i.e., the Colby Lake source is assumed constant through the modeled time period).

Risk:

There is moderate risk associated with the revisions to mass loading to Colby Lake. The inclusion of an additional mass source will increase modeled concentrations in Colby Lake for some constituents, relative to the results published in the SDEIS. The proposed model change is not expected to have any impact on other model inputs or estimated Partridge River concentrations.

The revisions to Colby Lake modeling in the Mine Site and Partridge River GoldSim model will not result in changes to the Plant Site model, even though Colby Lake water is used at the Plant Site and for flow augmentation in the Embarrass River watershed. This is because the current Plant Site model uses Colby Lake concentrations that are based on the observed average concentrations in the lake, rather than any results from the Mine Site model (see Section 5.2.2.8.2 of the Water Modeling Data Package – Volume 2 Plant Site v9).

Other Potential Impacts:

No change in direct wetland impacts is expected.

No change in geotechnical impacts is expected.

No change in air emissions impacts is expected.

No change in project footprint is expected.

Attachments:

Revised text and input tables will be included following approval of the proposed approach presented in Version 2 of this CDF.

Project Description Changes:

None expected.

Data Package/Work Plan Changes:

The following sections of the Water Modeling Data Package – Volume 1 Mine Site will be revised to reflect the proposed change in modeling:

- Section 4.4.4.3 Colby Lake and Whitewater Reservoir Data – text will be revised to reflect the currently available data (used in calibration of the Colby Lake source term).
- Section 5.1.1.2 Surface Water Conceptual Model – text will be revised to reflect the addition of a mass source term to Colby Lake conceptual model.
- Section 5.2.4.2 Colby Lake and Whitewater Reservoir – text will be revised to reflect the addition of a mass source term to the Colby Lake model node.
- Section 5.2.4.X Colby Lake Source Calibration – this new section will be added to describe the calibration of the Colby Lake source term (likely between existing sections 5.2.4.7 and 5.2.4.8).
- Section 6.5.5 Colby Lake – text in this section will be revised to reflect updated model results for water quality in Colby Lake. Model results may require additional discussion of specific constituents included in Section 6.5.6.1. Figures referenced in Section 6.5.5 and Section 6.5.6.1 will be updated to reflect current model output.
- Attachment B Input Variables to the Mine Site Model – this attachment will be revised to include the input values for the Colby Lake mass source term.
- Attachment E Calibration of Surface Runoff Concentrations – this attachment will be revised to describe the calibration of the Colby Lake mass source term.
- Attachment K Concentration Statistics at the Surface Water Evaluation locations – this attachment will be updated to reflect the current model output.

Management Plan Changes:

None expected.

Revision History:

Date	Version	Description
06/13/14	1	Internal draft for PolyMet Review
6/16/14	1	Version 1 sent to Co-Lead Agencies
7/16/14	1	Comments on version 1 received from Co-Lead Agencies
9/11/14	2	Version 2 sent to Co-Lead Agencies; revisions include • Inclusion of data consistent with recommendations in the Data Sufficiency Document Response to spreadsheet comments

Attachments

None